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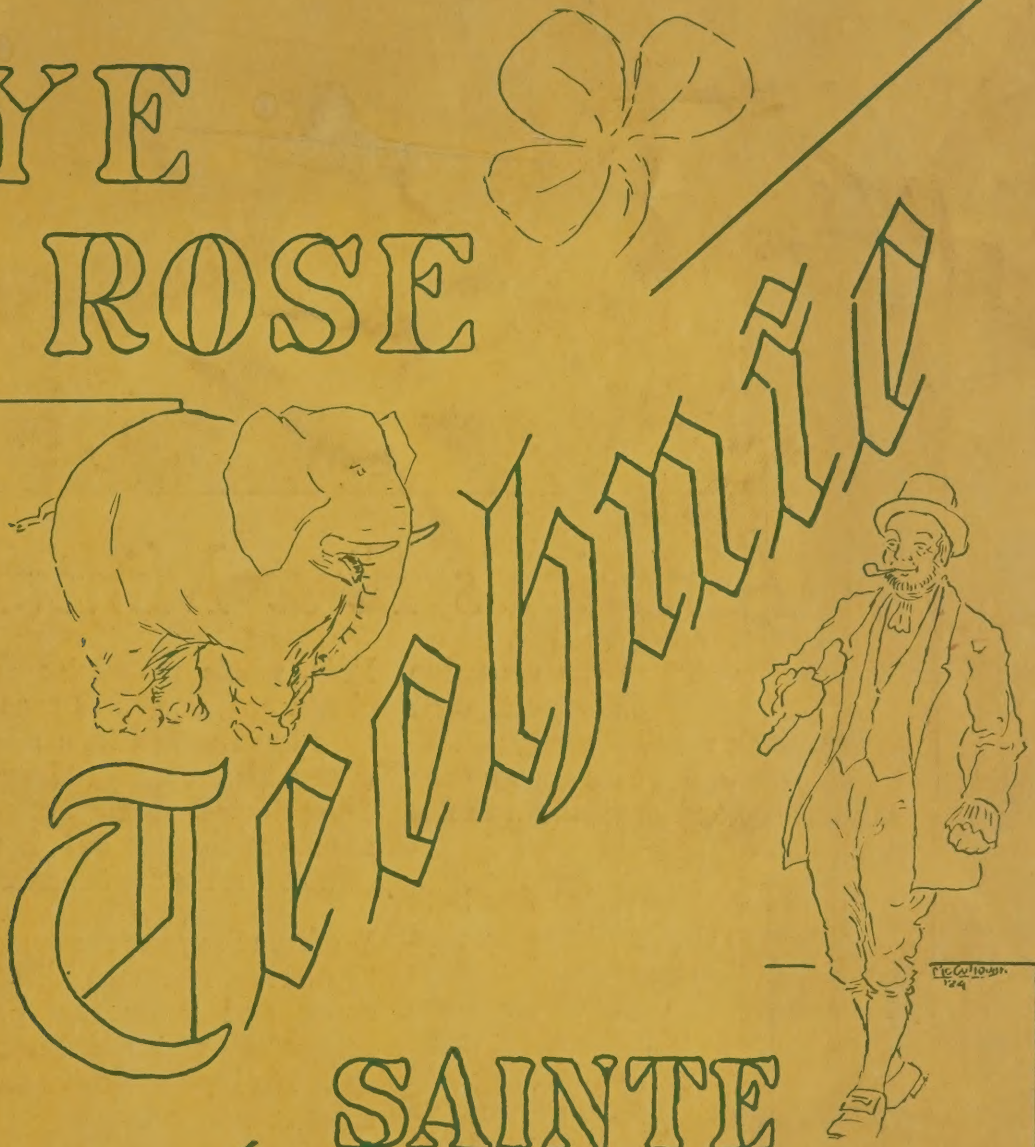

SAINTE PATRYCKE 1923

VOL. XXXII Member Engineering College Magazines Associated No. 6

America's First Miners

When the mammoth and the mastodon grazed in the vast places of our early country, prehistoric men were busy pounding shiny fragments of native copper from their rock settings on the southern shores of Lake Superior.

These miners of the Stone Age first built fires to disintegrate the harder rocks, then they pounded out their treasures. Hammers of diorite or porphyry, shaped by the waters of the lake or by hand, occasionally grooved and fitted with a handle; wedges made of the very substance they were mining and tempered by the pounding that fashioned them; shovels of cedar that were used only as scrapers; bailers of bark or carved wood —these were the tools used in their open pit mines.

Now, whole mountains are removed to obtain copper; 47,000 tons of copper ore have been mined in a single day at one mine with the aid of Hercules Explosives. The principal problem of today is not the mining of the metals, it is the elimination of waste in their production.

We have for years recommended Hercules Special No. 1 because of its higher cartridge count and lower cost per cartridge in comparison with the dynamites in general use. No high explosive on the market is more economical.

For further details write to our Advertising Department, 939 King Street, Wilmington, Delaware, for our booklet "Volume vs. Weight"—A lesson in explosives economy.

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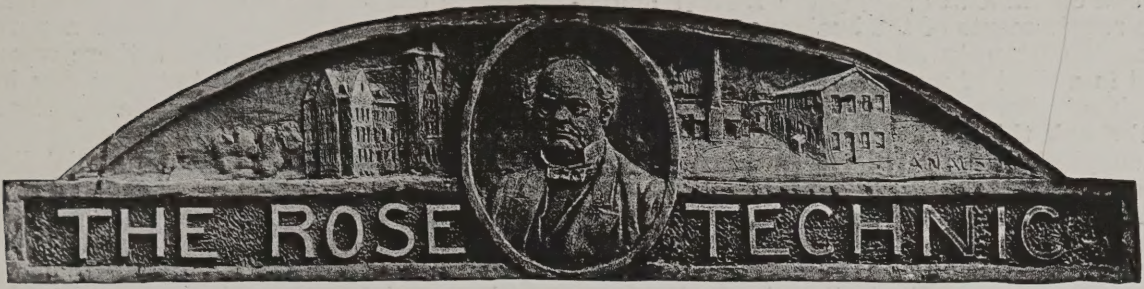

VOL. XXXII TERRE HAUTE, INDIANA, MARCH, 1923 No. 6

INDUSTRIAL MANAGEMENT

By W. ARNOLD LAYMAN, '92

(NOTE—This is the first of two articles by Mr. Layman on industrial management, the next one appearing in the April Technic. Mr. Layman used these notes as the basis of an address before the Production Managers' Club of St. Louis in November, and has submitted them to the Technic with apologies for not having elaborated on them. —Editor.)

Looking back over thirty years of active experience in industrial management, there are a number of conclusions which crystallize themselves out of this experience that may be of interest to Rose students and fellow alumni.

Selling Organization.

In my judgment, a strong selling organization is the most important contributing element to the success of an industrial institution. Every other phase of the business may be organized to a superlative degree of efficiency and yet will be ineffective without adequate sales. In the enterprises with which I have been actively identified, we have uniformly endeavored to create a selling organization stronger under normal business conditions than the production branch of the business. Henry Ford's unparalled industrial success is attributed to production methods, while as a matter of fact production methods of extraordinary excellence have been made possible by sales practically always in excess of production capacity. I have seen a number of businesses with excellent products of manufacture and highly efficient plant management languish because of the inadequacy of sales organization.

Avoidance of a Limited Number of Customers.

An acceptance of the easiest road to large sales volume sometimes leads to disaster. A business is in exceedingly vulnerable shape when it has a few customers individually taking a large volume of output. I have immediately in mind in making this comment, two important mid-west manufacturers, each of whom permitted his own sales organization to languish and gave preference to an individual large distributing house, until, in due course of time, the entire plant output was being sold through this distributing customer. In one instance there developed the tragedy of a disagreement with the distributing house on the question of proper price for what had become the entire output of the factory. A break of relations ensued, and several years were required to reestablish a selling organization and revive a diversified demand for the output. During the starvation period, bankruptcy was narrowly averted.

In the other instance, there similarly developed a complete abandonment of the manufacturer's own sales organization. The sales demand developed too rapidly for the manufacturer to safely finance the large output demanded of him. The purchasing distributor also expanded beyond the capacity of his capitalization and became so involved financially with the trade collapse of 1920, that complete financial disaster was visited upon the manufacturer, and his business has practically passed out of existence.

The two instances cited are merely typical. Innumerable similar industrial tradgedies could be recounted. Unless safe-guarded by financial interlocking, a diversification of customers is practically essential to the security and stability of an industrial investment.

Value of Good Will in Business.

The balance sheets of many incorporations—and particularly conservatively managed institutions which have not undergone modern "reorganization"—carry good will at a nominal figure. Yet, good will is the keystone to the arch of a permanently successful institution, and exceeds in money value frequently all the other assets of the business. As illustrating this, I have in mind the experience of an old-time wholesale drug house which was forced into bankruptcy by an unwise investment of its liquid resources in outside ventures which proved unprofitable. When the receiver took charge, there was less than a thousand dollars cash in bank, with a weekly payroll of many thousands of dollars to meet, and obligations to merchandise suppliers in large volume pressing for payment.

Yet, the trade reputation of this concern was so unusually high, based upon a long period of years of honorable trade methods, that the company's good will paved the way back to prosperity. Merchandise creditors stood by as to past obligations and continued to supply the further merchandise requirements of the business, and from the company's customers all over the country, there poured in a flood of purchase orders accompanied by such a volume of cash payment in advance, that through this medium alone, sufficient funds were supplied to revive the business and permit a program of operations restoring the company to virility. All creditors were paid in full, and the company is today in wonderful operating condition, with its trade friendships of the past creating a larger-than-ever good will item in the business.

I desire to recommend the great importance of the continous employment of a policy of strict attention to the customer, building a product equalling or surpassing its advertised quality, saturating your business throughout with the old-fashioned "Honesty is the Best Policy" doctrine, and pursuing those policies in general which contribute so effectively to the rapid building up of the good will element of the business.

Fair Competition.

I have observed that some of the happiest men in business have not necessarily been those most successful from the standpoint of financial accumulation. I have found these men carry practical Christianity into business, and fair competition is a cardinal principle with them.

A very wise friend has termed business the "greatest sport in the world." He means business conducted as best amateur sports are conducted, and he says the joys of business when so conducted are boundless. Business to be the greatest sport in the world—must not strike below the belt—must observe the rules of the game.

Avoidance of Guessing in Business.

A very prominent stock market operator of "the old school" once said he was satisfied to be right "51% of the time," and there is a more or less popular dictum to the effect that it is better to take a chance of being wrong than to delay action. I regard this as very dangerous advice to the young man entering upon a business career in the responsible management of other people's money As counterbalancing these dangerous slogans, which have had such wide publicity, I would recommend the absolute avoidance of guessing if you don't know what to do.

If the questions of policy and financial risk involved are purely personal and individual in characeter, the executive may do all the guessing he desires, but if he is carrying a large responsibility to others, then he should have a definitely thought-out foundation of reason for the course of action he pursues. Executives managing other people's affairs must be right, nearer 100% of the time than 51%, and must have a foundation of reason for their action rather than base their action on guess-work.

Labor Policy the Management's Biggest Internal Responsibility.

It is a singular fact that in many business institutions the principal executive officer pays little or no attention to the labor policy of his company. It is strange that this should be so, as in the majority of industrial institutions the largest single item of expense is the productive labor payroll. In the good old days when the employer and employe worked side by side, with a constant exchange of fraternal good will, there was no labor problem in the business; but that day has gone, not to return within the probable experience of the present day business generation.

Whatever the malady may be--social discontent; excess of democracy; too much mal-education; unfair division of profits of industry; or one or more of a hundred other phases of discontent and unrest—the industrial employer of today is face to face with a real labor problem. He should meet it squarely and qualify himself to deal with it.

It is not the purpose of my discussion to drag you into a long consideration of this question. I desire simply to emphasize the fact that the problem of management of labor in the individual industry is the chief executive's most important internal responsibility; and I think any young man in business looking forward to management responsibilities shuold study carefully the difficulties of this situation and map out a course of policy to be persued when he is called upon for action.

Some Important Details of Shop Management.

There are a number of considerations in actual management of the shop vitally conducive to peaceful and efficient operation. There must be no question of the continuous exercise in liberal spirit of the "square deal" toward every employe. The most liberal wages consistent with the prosperity of the business should be paid.

The management must know what is going on in the shop; detect evils quickly at their source, and administer correction of such evils promptly. The development of czarism on the part of superintendents and foremen must be adequately safeguarded against. No agitation of fraternalism, race, color, creed, or unionism should be permitted in the shop.

The individual employe should be protected against "boss-ism" either within or without the shop, and he should be free to develop his God-given talents as the business may healthfully permit. There should be little or none of the old-fashioned raising hell by shop executives; quiet, yet forceful, methods gain the best results in the long run. The fair conditions of employment should be made known to each employe at the time of employment, and a brief but clear general set of instructions to employes is a good thing to hand the new employe as he enters the shop.

IRON AND STEEL INDUSTRIES MAJOR POWER CONSUMERS.

In the making of iron and steel, more power is required than in any other single industry.

In 1904 there was installed in this industry 2,900,000 hp. of which 550,000 hp. or 18.4 per cent, was electric motors.

In 1914 the total horsepower installed was 4,060,000, of which 1,490,000 hp. or 36.7 per cent was electric motors.

In 1919 the total horsepower installed was 5,630,000 of which 2,811,000 hp. or 50 per cent, was electric motors.

St. Pat was an Engineer.

SOME CHARACTERISTICS OF MALLEABLE CAST IRON

By H. A. SCHWARTZ '01

The manufacture of malleable cast iron arose from a desire to produce a metal which could be successfully cast, but which would also be capable of considerable forming to shape by hammering.

Reaumur, the famous French physicist who gave his name also to a thermometer scale, in 1722 described a process for producing the desired result by making castings of white cast iron and exposing these to heat for considerable periods of time in contact with iron ore. The method depends on the oxidizing action of the ore on the carbon of the iron as for example:

$$Fe_3C + 3\,Fe_20_3 = 2\,Fe_30_4 + 3\,Fe + C0.$$

The iron was supposed to be left carbon free when it would obviously be soft and ductile.

In 1826 one Seth Boyden of Newark, New Jersey, was attempting to practice Reamur's method, but by accident, and unexpectedly, produced the reaction: $Fe_3C = 3\,Fe + C$

Since this reaction leaves the iron free of carbon, (in the combined form) the product would also be ductile although intermixed with nodules of graphite.

It must be clearly understood that all this was before any systematic knowledge of metallurgy was in existence. Neither Reaumur nor Boyden understood anything of the chemistry or metallography of their operations, and the characteristic reactions are supplied from our present knowledge of their methods.

On the basis of Boyden's pioneer work the American malleable industry has grown to an annual capacity of some one and one quarter million tons and to some two hundred odd foundries.

The industry has for various reasons remained almost exclusively American. Up to the beginning of the war there was but one European plant operating on this basis, excluding the European works of the American Radiator Co. and International Harvester Co. of America. Since then some ten or twelve plants have been started in England, and there is an interest in the subject in Belgium and France, which, however, has probably not yet produced any great changes in methods.

Malleable cast iron, in its American sense, is made by producing first a casting of white, or non-graphitic iron, having a composition somewhat as follows:

Carbon	2.50%
Silicon	.80%
Manganese	.30%
Sulphur	.04 to .08%
Phosphorus	.16 to .20%

The analysis is given merely as a type, there being considerable variations in practice both intentional and accidental.

Such metal may be prepared by melting suitable charges in the reverberatory furnace, the open hearth, or the electric furnace, or by treating suitable molten metal in the electric. Cupola melting yields metal too high in carbon and sulphur for the intended purpose unless used in connection with the triplex process. This process, originated by one of the executives of the National Company, consists of melting in the cupola, decarburizing a suitable proportion of the metal in the converter and reheating, deoxidizing, desulphurizing, and otherwise adjusting the chemical composition in the electric furnace.

Molding methods do not differ greatly from those of the grey iron foundry, except that greater care must be exercised in gating and feeding, since the melting point (liquidus) of the metal is considerably higher and the shrinkage twice as great as in grey iron.

The foundry having produced a sound casting, free, absolutely, of graphitic carbon, the next metallurgical step is to convert this hard and brittle casting, of white fracture, into the ductile, black fractured finished product. The operation is called annealing, although it is in no respect comparable to the annealing of steel.

The castings are heated for long periods of time, 40 to 90 hours, at temperatures of about 1600 degrees F to permit the reaction

$$Fe_3C = 3\,Fe + C$$

to occur. The reaction, as will be noted, involves only the constituents of the metal itself, and has no connection with the surrounding medium. It is quite slow so that the time for its completion, though great, can not be altered at the wish of the manufacturer or customer.

When all iron carbide is destroyed there still remains carbon in solid solution which must be thrown out during subsequent slow cooling, a point frequently overlooked by would-be inventors of accellerated annealing methods. Cooling rates to 1200 degrees F. run from 3 to 12 degrees per hour, so that the entire heat treatment including also the time to heat the furnace becomes a matter of from one to three weeks.

During annealing castings are often, but not always, packed in "pots" and surrounded by "packing." The function thereof is to protect the casting from the oxidizing action of flame and to support it when at high temperatures, it becomes somewhat plastic.

The compression strength is indeterminable since the metal never actually ruptures under pure compression, but merely flows out. Under cross bending stresses the modulus of rupture is about twice the ultimate tensile strength, and the proportional limit is very near that figure.

The properties of the material are reasonably well predictable from its micro-structure. The metal is ductile, as pure iron is, but not quite to the same degree as the iron, since both strength and elongation are reduced owing to the presence of what are practically voids when the carbon dots exist.

The present tentative A. S. T. M., specifications provide for a strength of 50,000 lbs. per square inch and an elongation of 10 per cent in 2 inches, both measured on a specimen of prescribed form. Young's modulus is about 25,000,000 lbs per square inch under either of these loadings.

The resistance to linear shear is about 9-10 the ultimate tensile strength. The fatigue limit (rotating beam type) is about 26,000 lbs. per square inch.

Most of the physical and engineering constants of the metal have been determined, but their inclusion here is hardly in order. The magnetic properties alone, perhaps, may be referred to. Like all other materials of construction, malleable castings have both their merits and their limitations. Some of the latter arise, commercially, from erroneous engineering practice.

The difference in volume between molten white cast iron and the same metal after freezing and cooling to room temperature is considerable (about 6%), while that of gray cast iron, owing to the separation of graphite during cooling is only about 3%. It is evident that if a casting shall not have porous areas, or voids, known as shrinks, some means must be provided for adding molten metal by feeder heads. It is obvious that this means that an open passage must be maintained from the head to the heavy section of the casting till the latter is solid. This can not be done through thin surrounding parts is frequently overlooked by the designer.

An equally common fault is the use of abrupt changes of section, or the arranging of parts of widely different cross section in such a manner that they exercise restraint upon each other in cooling. Thick and thin parts shrink equally, but not at the same time since the thicker sections cool more slowly than the thinner. Strains are thus set up which cause cracks and pulls in the castings coming from the molds.

Castings expand in annealing in proportion to carbon content, which may vary. They also sag and bend somewhat and require straightening. Both facts make it impossible to produce castings of absolutely unvarying size from a given pattern. Variations in dimensions of about 1% are practically unavoidable. If closer tolerances are required, a finishing operation is the only remedy.

One fault the metal is frequently accused of having is that it is worthless after machining, "the strength being only in the skin." The surface of all castings, including steel, loses carbon if heat treated. Malleable castings, as an incident to annealing, are thus usually decarburized at the surface also, as the Reaumur castings were throughout. This skin is, however, but little stronger, although considerably more ductile than the center.

The fallacy of the argument will be obvious if the reader will himself solve the problem which follows.

If a malleable test specimen 5-8 inch in diameter has an apparent tensile strength of 50,000 lbs. per square inch, but this strength all resides in the decarburized layer .06 inch thick at the surface, what is the actual tensile strength of this decarburized metal in lbs. per square inch?

Compare the result with the value 48,000 lbs. per square inch frequently assigned to pure iron.

Malleable castings machine more easily than any other ferrous material, and by far the greater portion of the nation's tonnage is subjected to some form of machining operation.

ELECTRONS

A true and constantly better understanding of the things about us depends in large measure upon research. The study of the behavior of the electron which is now looked upon as composing all matter, has resulted in astonishing contributions to human welfare.

When electrons, or little units of negative electricity, flow within a wire, they constitute the electric current. When, by high temperature, they are emitted from a metal, they are called thermions. When they pass through a gas with sufficient velocity, their impact decomposes molecules, and the greatly augmented flow of the resulting charged particles produce the common electric arc. When they flow through a vacuous space, under the influence of a high electric force, they are called cathode rays. When their motion is stopped by impact in the surface of a solid, the sudden change of motion starts an electro-magnetic wave, —an X-ray (just as a drum beat sets up a sound wave in the air); and when they surge up and down a wireless antennae, they produce the long wireless waves through space.

When constituent electrons are arranged in the groups called atoms, all properties seem determined merely by geography or orientation. Apparently such old established things as chemical activity and valence are due to the number of electrons which occupy the outer surfaces of the groups. The shooting electrons of the cathode ray, stopped by the platinum or tungsten target, produce the X-rays, which by reflection in crystallized matter, disclose its atomic arrangement and thus lead to better understanding of many physical properties.

Since decomposing elements emit electrons, since heat drives them from filaments, since gases and air yield them on impact in arcs, since statically charged bodies carry them and lose them (as a car gains or loses passengers), it is logical that all electric currents are attributed to their motion, all static charges to differences in concentration, and all matters to balance combinations of them.

A party of darkies were in the midst of a crap game when the law stepped in. One little darky, spying the wagon outside, made a wild dash for the door. The officer on guard stopped him, saying. "No you don't—you can't get away." To which the darky replied: "Lawsee, officer, Ah jes wants to get a seat dis time."

RAMBLES THROUGH A COPPER REFINERY

CONTINUED FROM MARCH ISSUE

At the back, or inner side of each mold, there was a long handle which traveled on a bar arranged for it. As the mold, in traveling around the circle, came to a position three fourths of the way around, this bar raised the handle until the mold was overbalanced and toppled forward, the handle striking another bar with a jar, calculated to throw the copper cake into a vat of water. Water is sprayed on the cake throughout the third quarter of the revolution so that the sudden dousing in water as the cake leaves the mold will not produce a positive explosion. As the mold travels on after dropping the cake, it is sprayed with 'bone dust' to keep the copper from sticking to the mold.

"A chain conveyor hauled me out of that vat and a grappling hook picked me up and set me down on a little narrow guage car. Set a whole mess of other fellows on top of me too. Little engine came snorting along, hooked onto all the cars of us there in the building, and shunted us over to the scale house.

"Some fellow came along with a pot of grease paint, and painted a lot number and the letter S on my near edge. Didn't know what it was all about until some lady came out with a book in her hand, looked at me and said, 'This is the sample, Steve!'

"Then I knew that I was a sample, but it didn't mean anything in MY young life——THEN.

"We were all hauled through the scale house tunnel, and each car was separately weighed on each of two scales, and the weights checked. I heard later that these scales are so accurate that they may be depended upon to give perfect measure of fifteen thousand pounds of copper, or a pound of sugar—and the two scales will check either of those weights.

"My car was shoved off onto one track, while all the other cars I'd come over with were put on another one. Say! I stood there on that car all day. Once in a while another car would be shoved onto my track. Sometimes it was loaded with others of my kind, but sometimes there were fellows who had been cast in other countries. Had a fairly good time telling our experiences to each other that day.

"Next day they took me to the drill room. And now I must tell you about my operation. My good chap, there were two incisions made, and I never even took an anaesthetic! Yes I know it sounds foolhardy, but then you know I am such a firm believer in Coueism. And would you believe me, throughout the whole operation, I merely kept repeating the words, 'Eevery minute, without no limit, this is hurting lesser and lesser', and though I could hear the terrible grinding of the drill, and see the bright shavings dropping from my body, I experienced not the slightest pain. Yes, it was quite marvelous. * * * * * Oh, yes, yes, of course. I must go on with my story. Still, there never was an operation just—what's that? You don't care about my operation, but want me to hurry up and finish about my trip? Well! Of all the unsympathetic people—Still, if you insist.

"All the shavings or drillings, were collected, and all of them from my car were put in one bucket. By assiduous questioning, I discovered just what happened to those poor little things. They were ground very fine, weighed and taken to the chemical laboratory, where they were carefully analyzed for copper content. Of course that was the last I ever saw of them.

"From the drill room I was taken directly to the casting building, and my car, with a lot of others, was placed on a truck directly in front of the Anode Furnaces. There are four of these furnaces, and the row of cars extended along the whole front. Pretty soon, I noticed signs of activity ahead, and began to be frightened. After what seemed aeons of suspense, a monstrous machine approached my car, came closer and closer, and finally shot a long arm right in under us. Then we felt ourselves being lifted and carried, and almost before we had caught our breath, the whole car load of us was dumped into the furnace.

"This furnace charger is worthy of a description. It consists, essentially, of a long arm, suspended from the roof of the building by a cylindrical, sliding shaft, and running on tracks at the top of the building. It is so constructed, that an operator, sitting in the cab at one end of the arm, can control the movements of the machine, and make it go in almost any direction. An experienced operator can control his charger with as great flexibility as the average automobile. At the forward end of the arm is a fork, suitable for picking almost any object by running the fork under the object. A plate at the rear end of the fork is so arranged that it can be moved forward, pushing the load from the charger fork. It is indeed a most ingenious mechanism, or at least, so I thought.

"After a few hours in the Anode furnace, we were pretty well melted, and we were poured out into another mold. Now we discovered, we were Anodes, and ready for the electrolytic tanks.

My anode was about four by four feet in size, and perhaps three inches thick. With it I was taken to the tank house, and hung in a vat of copper nitrate, mixed with copper sulphate and sulphuric acid. I had no sooner struck the bath than queer thrills started to run through me. Couldn't make out what it was all about. It was a very queer experience. Slowly I lost consciousness and when I revived, I felt entirely different, I couldn't quite decide what the difference was until I was taken from the tank and had the opportunity to

(Continued on page 12)

THE JUNIOR PROM

By RAYMOND FITTERER, '24

Two months separate us from what will be an outstanding event in Rose history. Probably no other student activity in the Institute has ever made preparations as far-recahing as those directed toward the materialization of the first, real JUNIOR PROM.

Previous articles in THE TECHNIC stated that efforts were being made to secure the best kind of orchestra for this event. The time is ripe to prove to the Alumni, to boosters of Rose, and even to some doubting students, that this affair is really being planned on a large scale.

The Oriole Terrace Orchestra, now playing at Marigold Gardens, Chicago; Isham Jones, Ted Lewis' Band and the Metropolitan Happy Six—dance orchestras whose fame has been broadcast throughout the United States on records and by personal appearances—are the ones from which the Prom committee will select the orchestration for the Prom.

Negotiations are being carried on with all four of these "bands". Co-operation has been given the Prom committee by the Indiana Theatre, and the Brunswick Shop to bring one of these four superb orchestras to Rose for the Junior Prom.

Personal interviews with Lewis, Jones and the Metropolitans have been arranged; Brunswick and the Indiana are exerting every effort to get the Oriole Terrace players here. Every assurance is had that musicians who could not be secured, except at an impossible price, for any other occasion, will furnish the music for Rose's first Junior Prom.

Whichever one of these four famous bands is signed—will have been contracted with by the first week of March, and every student in school will have been solicited. Already, a goodly sale of tickets has been effected, and over fifty students are now paying on their tickets on the weekly installment plan.

Since the Seniors are guests of the Junior Classmen, it is necessary that the latter have the fullest support of all the underclassmen, and as many Alumni as possible, and then select a certain number of desirable local people who will add to the success of the occasion.

It is estimated that our gymnasium will easily accomodate from 250 to 300 couples for dancing. This offers a measure of the magnitude of the Prom undertaking.

Every Alumnus who is considering attending the Prom should communicate with the committee before April 5. For the benefit of those who may not be able to decide immediately, the tentative dates selected are the 4th, 5th, 11th, or 12th of May.

ROSE GRADS, if you will be unable to attend the Big Reunion of the Alumni in June, and have a possible chance of getting back for the Prom, do so by all means. See the new school in a new and novel way. Come and meet your own classmates, and make the Prom a miniature Reunion in itself. But remember that your notice must be in the hands of the committee by April 5th.

....**Students, Alumni and Supporters of Rose—Let's make this the most PROMINENT event of the year!!**

ABOUT THE CAMPUS

"Fessor" McCormick says that the Senior Civils "are designing a bridge, using the principle of 'least work' ".

Of course, the Senior Mechanicals wouldn't enjoy St. Pat's without throwing the proverbial monkey wrench into the parade.

And it is rumored that King Tut will be revived at his tomb by the Senior Chemists. Another rumor which has floated around is that the Senior Civils are going to impersonate the Surveyors of King Tut in the parade.

After all, wasn't King Tut an Engineer ?

The Chemical Department has practically completed its installation of industrial equipment. A coal grinding machine, crusher, pebble mill, vacuum pump and compressor are connected to a line shaft, pulled by a 3-h. p. motor. A great deal of the work of designing, and practically all of the lay-out work was done by the Senior Chemists.

Warm weather—as promised—will be a boon to the Military Department, for then work can be finished on the butts of the rifle range, and outdoor drill, of which there has been very little all year, can be started. The presene dampness of the ground does not permit of outdoor drill, or maneuvers.

The concrete section of the Testing lab. is in good shape for cement and concrete testing since the flooring and benches have been put in. Prof. Thomas has been making, and supervising, tests throughout the year on concrete blocks, with the assistance of students in the Testing lab.

Activities of the Camera Club are promised for the first show of real spring weather. Though no definite reorganization has taken place yet, a good turnout for club membership is expected. There is great value to the engineer in the ability and knowledge he may display in the use of a camera, especially in outdoor building, surveys, and prospecting projects. If you are interested, see Prof. Peddle, and he will gladly list you.

(Continued on page 12)

SAINT PATRICK RE-VISITS ROSE; MARKS WONDERFUL TRANSFORMATION SINCE HIS LAST VISIT IN 1922

Patron Saint of Engineers Spends Annual Holiday With Rose Men—Impressed With Variety, Splendor And Engineering Style of Welcome—Short Stay.

St. Patrick arrived in Terre Haute on the morning of March 16, "all cocked and primed" for his annual debut among the frolicsome Engineers.

His visit will not be as long as formerly, on account of the threatening return of the Snakes to Ireland, but the Patron Saint of Engineers is glad to be at home, even for a transitory visit.

The committee of welcome met "Pathrick" at the Aviation Field, the newest adjunct to the Institute Campus, where his seaplane landed at seven a. m. The committee was forced to wait only a short time, however, as the porter had awakened him for his morning plunge and eye-opener as the plane passed over Cleveland.

Shining, royal emerald green—the green that has graced the shamrocks for ages—was the attire of S. P. His hat was of green brocaded silk—the latest "topper" in technical styles; his morning coat a spotless aurora of blended blues and yellows—merging into the royal green of aulde Yreland.

Committee Provides Wet Welcome

The committee of welcome was composed of Dr. Clarunz P. Sousley, Prof. "Robber" McCormick, (third cousin to St. Pat); Prof. Alfred "Kid" Child, George Washington, Sylvester St. Clair and President Harding. As Prof. Child was the junior member of the committee, he opened the door of the aerial car when S. P. alighted.

"Gentlemen, gentlemen, gentlemen! I'll buy the first round of drinks if you'll direct me to the closest ale-house," quoth St. Pat.

"No, no! not so," replied Brave Alfred. "I have here on my hip a special concoction from the celebrated chemical laboratories of Rose, wherein lies renewed vigor, great soothing power and an indefinable tang—like the tang of the wild mustang—a powerful kick."

And so saying, Kid Child produced a demi-john of home made corn liquor, prepared synthetically from artificial corn flowers.

The patron saint quaffed deeply of the potion, and smacking his lips shouted: "Ah, that's better than my favorite, which I make by dissolving shinola in prussic acid."

After the bottle had gotten half way around and had been emptied, Vester St. Clair produced his portion of "coroner's cocktails" and divvied up with Doc Sousley.

"Forsooth, let us seek out this old haunt of mine," said Pat, "and visit the halls of learning wherein the scholarly gentlemen of Rose have so long slept."

Awe, pleasure, pride, surprise, and magnanimity—all these assailed St. Pat as he strolled across the rolling commons of Rose and gazed at the immense wireless tower which the Junior class put up at the behest of the president, as their memorial— and his heart beat non-synchrononously, like an oscilliating ampere in a sea of volts.

Inscribed on the portico of Rose, St. Pat saw:

"* * * *Like all the other good fellows,
"We drink our whiskey clear, * * * * * *";

And wept at the bitter irony of fate.

Saint Patrick is billed for a box seat at the Hippodrome performance this afternoon, after which he will have to leave immediately.

His stay is curtailed, as has been said, by the necessity of his presence in fighting the attempts of the snakes to "come back" to Erin.

Hence, Pat will be unable to witness the Garguantan parade—the annual jamboree of Engineers—this evening. He had accepted an invitation to be a patron of the danse, but his hurried leave-taking will prevent his fulfllling this position of honor this evening.

Great secrecy surrounded the work of the Engineers on their parade this evening. Little is known as to even how many ambulances will be needed, or how many combatants will survive the evening.

In former years secrecy was not so much practiced, but the necessity for the utmost care in the preparations for the 1923 ST. PAT'S was emphasized by the fact that spies from the Indiana State Normal School are planning to obtain as much information as they can as to the erection of floats, and will attempt at an early date to pictorialize what they so modestly term:

A Pedagogic Interpretation of the Horrors of an Engineering Saint Patrick's Day Celebration— by the Students of "Indiana, Dear State Normal."

The parade will start about seven o'clock, however, probably from the Hemingway House, in North Seventh Street.

Visitors are invited to attend the celebration, but are warned against the marauding Normalites, who are putting in practice what they learn in their class in "Modern Holdup Practices, illustrated."

"Just a little bit of a girl," he remarked, as he brushed a hair from his shoulder."

At a lecture the other evening we heard the speaker remark:—

" . . . and statistics show, gentlemen, that every time I breathe, some one dies!"

Voice from the rear:—"Why don't you try cloves?"

"What line of poetry suggests our modern dance?"

" 'The stag at eve had drunk his fill.' "

ENGINEERS LOSE LAST FOUR COURT ENCOUNTERS

By HANK McCOMB, '23

The Engineers met defeat at the hands of Franklin for the second time this season, on Feb. 16, at the Rose Gym. The Baptists displayed clock-like precision in the passwork and teamplay and had little trouble in piling up a 40 to 16 count on the men of Rose.

Starting with second string men, the Franklin crew had an eight point lead at the end of half time. With the entrance of the regulars into the fray the Baptists looped the sphere into the net with regularity while the Rosemen were making but three points.

Staggs and Schoonover put up a scrappy game for Rose. The former caged four markers, while "Schoonie" battled hard on the defensive end. Watson played a consistent floor game.

The next tilt on the program of the Engineers was with the fast Butler quintet, which had previously drubbed Millen's gang at the capitol city by a comfortable margin. The Bulldogs repeated this time, giving Poly a 39 to 19 lacing.

Skeeters and Lentz fought hard in an effort to overcome the fast passwork of Page's men, but the teamwork of the Rose combination was not of the quality to stop the Indianapolis bunch. Hooker, playing forward for Butler, went wild, caging six markers in the initial frame and four in the last half.

After losing to Hanover earlier in the year by a 30 to 9 score the Engineers, on Feb. 23, allowed the southern Indiana netmen to turn the trick a second time. The score stood at 37 to 19 at the final whistle. H. Powell caged himself eight goals. None of the Rosemen hit the net with any regularity.

Feb. 28 brought to a close the rather ragged basket schedule of Millen's squad. The final tussle brought the Engineers face to face with the old rival, Indiana State Normal.

In American "slanguage" the teachers put the "hooks" into the Rose five. The score was 39 to 20. Staggs and Schoonover played good games for Rose, but they couldn't offset the steady stream of shots by Burris and Bratton. These men accounted for 25 of the points made by the Normal outfit.

By graduation, the basketball varsity will not lose a single regular. This fact makes things appear rather rosy for a winning combination next year. The only man on the squad to be lost by graduation will be Tyler, who has been playing four years for the Engineers. He has been a reliable net man.

TRACK AND BASEBALL PRACTICE STARTED

The first call for baseball and track men was issued by coach Millen on March 5. About 18 diamond aspirants heeded the call while 25 men signified their intentions of joining the track squad. The prospects for winning teams in these sports is far from bright, because of the fact that there is no place whatever on the Campus fitted for practice, and without practice there will, of course, be no exceptional teams turned out.

The schedules in track and baseball have not been completed, but there will be the usual number of diamond encounters. Millen plans on scheduling about three dual meets for his thin clads, probably wit hState Normal, DePauw and Hanover.

SPORTLETS

Someone might object to practicing baseball on the runway, especially if a baseball should roll off into E. E. lab and break a meter or so.

The cinder foundation for the walk along the west side of the school will be a good sprint stretch, if the roller is taken over it a few times. Incidentally, the distance men might run on over to the barn.

Underclassmen may apply for assistantships in sports. By working during their sophomore year, students may rate first assistant in junior year, and manager when they are seniors. Turn your name in to Coach Millen if you are willing to work.

With continued warm weather, we may expect to get the "battling tennis team" started in practice. Our real stars all graduated last year, so material will have to be developed. For the information of some who may not know, tennis is decidedly a "man's game." The effeminacy which is commonly attributed to it can be ascribed to the fact that co-eds (with whom, graciously, we are not bothered) have a habit of "strutting their material" on the tennis courts, instead of trying to learn the game. Incidentally, a letter in tennis is the most valuable letter that can be earned in the so-called minor sports.

With Mc Comb, Stallard and Staggs in the dashes; Schoonover and Iker in the weight division; Wright, Griffith and Dreher in the distance runs; Sevedge and White at the vault; McDargh, Kadel and Schoonover in the hurdles; Staggs and McComb in the broadjump—and a variety of men of unknown calibre out for track—things look good for a track tea mdespite the lack of a field practice field.

It's the middle of March and we haven't any definite arrangements yet for a baseball practice field. It seems as though we're going to have about as late a start in baseball as we had in basketball. Indoor practice helps a good deal, but the actual contact with "the dirt" is the thing that is most needed. The III park will apparently unobtainable on account of the Terre Haute club practicing there; so what shall we do ?

ALUMNI

PROGRAM FOR BIG REUNION TENTATIVELY ARRANGED.

Headquarters—Deming Hotel.
Alumni Day, June 6, 1923:

8:00 a. m. to 12 noon—Assignment of rooms, distribution of badges, and get-together meeting.

12:00 noon—1:00 p. m.—Luncheon at Deming Hotel.

2:00 p. m.—5:00 p. m.—Alumni vs. Varsity ball game.

6:30 p. m.—Dinner at Country Club.

Commencement Day, June 7:

Morning—Participation in commencement exercises.

Afternoon—Lunch and Alumni business meeting, Deming.

7:00 p. m.—Alumni banquet, Hotel Deming.

NEW TECH CLUB ORGANIZED.

At a meeting held Feb. 21, 1923, the MOBERLY TECH CLUB was organized. The charter members were H. O. Kelley, '13, and R. P. Long, '18. The officers elected were: Kelley, president; Long, vice-president. It was thought that, as "little would be said or done worth recording"—to quote Mr. Long—no recording secretary would be needed.

Kelley is division engineer, and Long assistant engineer, with the Wabash railway, at Moberly.

Welcome, babes in the woods!

Lawton, '06, who has been in the Canal Zone, is now farming at Walker, N. Y.

Mikels, '18, has left G. E. at Schenectady and is engineer in commercial department of the Springfield Light, Heat and Power Co., Springfield, Ohio.

Moore, '14, who was with Milliken Refinery, Arkansas City, Kansas, is now with Marland Refining Co. at Ponca City, Okla.

Reese, '13, who has been assistant editor of the Gas Age Record in New York, has gone to Westinghouse at South Philadelphia, Pa.

Post, '07, formerly chief electrical inspector at Akron, is now electrical engineer with the Chicago Union Station Co.

Reibel, '21, is with the LaSalle Tool Co., LaSalle, Ill.

Vrydagh, '18, has left the American Bridge Co., and is with the Union Iron Works at Los Angeles, California.

Reynolds, '05, has left St. Louis for Cleveland, and is manager of the Interstate Sales Co., there. Address Room 211, 1200 West 9th St.

Failing, '18, is now in the statistical dep't, Commonwealth Edison Co., Chicago.

Maxwell, '20 (Skeet) has a position with the Electric Steel Foundry Co., at Portland, Oregon.

G. V. Woody, '09, visited the school March 2nd.

St. Louis Tech Club.

At a meeting held early in February at the University Club, the following members of the St. Louis Tech Club were present: Kessler, '97, Wamsley, '98, Hatch, '06, Hepp, '12, Holding, '17, Wells, '96, Layman, '92.

The next meeting will be held sometime in April, at the home of W. Arnold Layman, '92.

Jumper, '02, is chemist in the bureau of standards, Washington.

Leibing, '16, has been transferred by General Electric Co., from Schenectady to Cincinnati.

Meyers, '07, is with the Koppel Industrial Car and Equipment Co., in new York.

Lawton, '06, who has been at Corazol, Canal Zone, has returned to the States and is farming at Walker, N. Y.

McKeever, '16, is with the Houston Fuel and Gas Co., Houston, Texas.

A. B. Moore, '97, died suddenly Feb. 8th, in Minneapolis.

Irwin Weir, '20, visited school, Saturday, March 3. Weir is in the research department of the General Electric company.

Albert W. King, '20, is now located at Richmond, Ind., where he is employd as manager of the Richmond Dairy Company.

Gray, '13, Describes National Road

"Dollie" Gray, '13, writing to Miss Mary Gilbert, Registrar, describes the National Road as follows:

"The National Road, which is the proper name for this highway, was established from Cumberland, Md. to Wheeling W. Va. by an act of Congress in 1806, and was later extended to St. Louis. Lately an organization known as the National Old Trails ighway Association, has suceeded in establishing a road west from St. Louis as a continuation of the National Road, extending to the West coast, with its terminal at Los Angeles.

"The total mileage across the continent by this route is 3, 134 miles. Continuous pavement now extends from Baltimore to St. Louis, a distance of 820 miles, and prospected building in Missouri will probably bring this stretch up to 1,122 miles within the next two years."

The Honor Commission Executive Council has resigned, after voicing the realization that the application of the Honor Code according to former practice was a failure.

The resignation of members of the Honor Commission does not mean that cribbing is recognized. In no sense is the personal obligation of every man to be honest and honorably mitigated in the least. Rather should each student assume more than a modicum responsibility for himself, and guard against violating the spirit of the Rose Code of Honor.

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D. V. Eichin, '23	Alumni Editor.
H. B. Hood, '24	Exchange Editor.
S. J. St. Clair, '23	Activities.
H. J. McComb, '23	Athletics.
Francis McCullough, '24	Artist.

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A. E. Woolen, '23	Business Manager.
R. H. Bolin, '25	Advertising Manager.
J. L. Tygart, '23	Circulation Manager.
Carson Simms, '24	Assistant Circulation Manager.
J. A. Vanderkloot, '25	Assistant Advertising Manager.

Address all communications to
THE ROSE TECHNIC,
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GOOD ROADS HELP DEVELOP NATIONAL DEFENSE

Without alluding to the question of national preparedness against contingencies such as the country's being invaded, or declaring war, it is safe to say that the development of good roads in the United States, aside from its value commercially, is distinctly an asset to the preparation of a strong national defense.

The majority of citizens of the United States are believers in preparedness—as a matter of principle and practice. We are at the outer circle of Europe's petty disputes, but even at such a distance, we are not entirely free from feeling the effects of disturbances occurring abroad.

Engineers of the War Department, and in the services of the nation through the departments correlated to the cabinet of the president, have spent a good deal of time planning an effective system of road building which will stimulate both inter-city, inter-state and inter-seaboard traffic and travel, as well as provide lanes for the moving of military equipment in case of war.

According to the report of the bureau of public roads, "There are certain vital areas along the boundaries of the United States against which any invasion will probably be directed. For military purposes, they should be connected with the centers of production and storage and industrial centers. The roads will then become strategic lines of supply and will usually conform with roads located for other purposes. Transcontinental routes are of no particular value for military purposes."

The bureau engineers believe that these strategic points can be connected in such a way as to render a two-fold purpose and not seriously dislocate the plan of development for other roads. These roads would serve as military routes, and at the same time fulfill commercial and economic needs for transportation and travel.

It is the expectation of the bureau of public roads to include this plan of strategic road building in the Federal-aid highway system, and make the plan a strong factor in our national defense.

A strong evidencing of the importance of the construction of an organized system of highways has come through the establishment, in several technical schools in the United States, of highway engineering courses. The youth of our country, technically minded, will find in this work, ample room for improvement, and betterment.

The actual elimination of theses for this year has not wrought as much hardship as some students thought. The heads of departments are allowing a great deal of choice in practical problems which Seniors wish to work on, and in this respect are allowing short thesis titles.

COMPLETE LIST OF CLASS MEMORIALS

‘86 — Boulder.
‘96 — Boulder.
‘97 — Stepping stones at front gate.
‘98 — Brass plate in vestibule floor.
‘99 — Brass plate over entrance.
‘00 — Stone tablet over entrance.
‘01 — Grill over entrance.
‘02 — Clock faces.
‘03 — Front doors.
‘04 — Lamp in vestibule.
‘05 — Grill fence in portico.
‘06 — Chandelier in hall.
‘07 — Front gates.
‘08 — Wing walls at gate.
‘09 — Cement front walk.
‘10 — Water heater in gymnasium.
‘11 — Chauncey Rose memorial tablet in vestibule.
‘12 — R. P. I. sign over entrance.
‘13 — Drinking fountains.
‘14 — Lockers in gymnasium.
‘15 — Bulletin board.
‘16 — Program clock.
‘17 — $200 10-payment Insurance Policy each man, Institution beneficiary.
‘18 — $200 for future memorial.
‘19 — $100 Liberty Bond.
‘20, ‘21, ‘22, ‘23 — Sun dial. Also Dr. Mees bronze memorial tablet.

Movie directors, please copy

IN fiction and the movies all college men naturally fall into two groups. Those who pass their days and nights "Rah! Rah!"-ing and snake-dancing; and those who never appear except with evening clothes—and cane.

The man who works his way through college simply doesn't figure.

Taking care of a furnace, running a laundry, waiting on table, tutoring, covering for a city paper, working in shop or office in vacation—all this may be lacking in romantic appeal, but it is an essential part of the college picture.

And a valuable part. The whole college is the gainer for the earnestness of men who want their education that hard.

Valuable to the college, but even more to the men who travel this rough going. They learn an important lesson in Applied Economics—the amount of sweat a ten dollar bill represents.

If you are one of them you may sometimes feel that you are missing a good deal of worthwhile college life. If you are not, you may be missing a good deal, too.

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RAMBLES

(Continued from page 5)

look at myself. Then I could see that I had changed indeed. My color was more beautiful than it had ever been before, but my complexion—terrible eruptions simply covered me. I was so ashamed I tried to keep myself hidden. As to size, I had exactly the same large dimensions as before, but I was not more than an inch thick.

"For a day or two now, I lay around the yards, but finally I was taken back to the casting building, but this time it was to the other end of the building. This time I was to go into the wire bar furnace, and I drew number six. There are four of these, too, but number eight was out of commission with a caved roof.

"By now, you know, I was absolutely pure copper. Nothing left of any of my impurities. Even the gold and silver to which I had clung to the last had been separated from me in the tank house.

"Twenty-two hours in the wire bar furnace just about cooked my goose, but I did manage to survive it. Don't mind saying though, that I was darned glad when they let me out. Poured me into another mold, they did. This time it was a two-fifty wire-bar mold, and if I do say it, as I shouldn't, I'm sure a beauty now.

"I may as well explain about the products of the wire bar furnaces. From these furnaces roll the following kinds of copper shapes: wire bars in weights as follows: 140, 175, 205, 250, 275; cakes, which are classed by dimensions, and of which there are about fifteen sizes; ingot bars, which average about 85 pounds, ingots, which average about 45 pounds.

"As I say, I'm a two-fifty, and I think that size is the most perfect example of the wire-bar.

"Of course I had to go through the scale house again to be weighed out, but now I am on the boat dock at last, and I'll soon be on my way to Europe. Yeh, I'm going to France.

"Well, here comes the crane for my stack. So long, old thing. Toodle-oo!"

This farewell was wafted back to me as the stack of wire bars swung through the air at the end of the crane arm and was deposited on the deck of the barge which was to take a load to New York for shipment.

CAMPUS NOTES

The Sweater Hop of March 2 was a mighty good dance, but the crowd that showed up was very small in proportion to the quality of the dance. Scarcely 50 couples were in the gym. The principal diversion of the evening besides dancing, was watching the eclipse of the moon from the east windows. Several strolled out the front walk to peep at Luna hiding herself.

With the revival of warm weather comes also the revival of the Royal Order of Bumming Engineers. The bumming order lost a good many of its initial recruits after the football season, but the baseball season will offer renewed opportuni-

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How many clothes have you hanging round the house now, in the front hall, or up in a clothes closet? How many of them do you wear?

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Here's what a man with some twenty-five year's of experience as a teacher and advisor to college men has to say on the subject. Dr. Ira O. Baker of the University of Illinois said not long ago:

"The cultivation of intellectual power and not the acquisition of a mass of facts is the most important element of an education—even though it be an engineering education."

The lack of conversational ability, social graces and broad knowledge of general matters, marks an engineer or anyone else as an ignorant man. What will so readily cultivate the above mentioned requisites as a whole-hearted participation in school and student activities which will follow a proper school spirit. Note the following excerpt from a speech by President Angell of Yale.

"The American college graduate entertains for his institution, a type of loyalty that is one of the very splendid things of an American life. I know of nothing which is comparable to it. I think it is unique in the sense that it is hardly known in other countries as it is in our own. It is a thing that arouses the amazement of a Frenchman or a German. It is hardly known even in England."

We, the undergraduates of the American colleges, are proud indeed that such a spirit exists among the graduates. Yet how sadly lacking in that spirit are we, as a whole! School spirit we have; yes, in the sense that we are always ready to yell our heads off at any game in which our college participates. But as to real reverence——?

Think it over fellows. If the shoe fits, put it on: You'll find that it wears well. If it doesn't fit, put a new shine on the old shoe so that ousiders can notice it. You'll feel better.

In days of Old the Knights were bold
And many's the brave life led,
But now today, the best Knights, we say,
Are the one's we spend in bed.

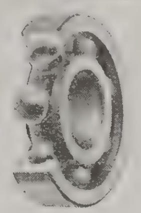
Rastus: "Liza, will you go riding in my Ford?"
Liza: "I won't do nothin' else."
Rastus: "Then you can't ride in mah Ford."

THE STAMP OF LEARNING.

"Pa, What's a post-graduate?"

"A graduate of one of those correspondence schools, I suppose."

A sophomore rises to inquire what we get out of study, anyway. The question seems to be, not what, but when.



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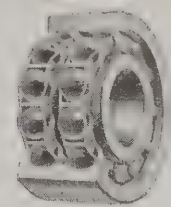

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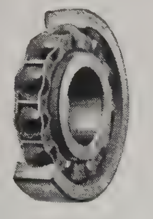

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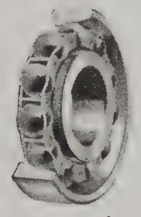

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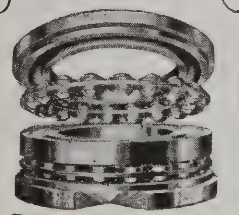

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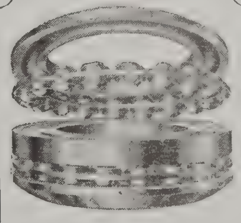

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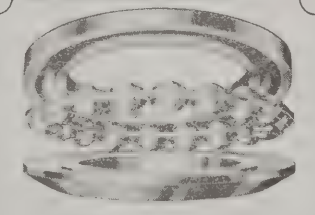
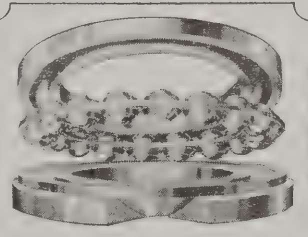


Single-acting, self-aligning thrust bearing. 1100 Series.



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PATRONIZE THEM

BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions. The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about ⅓ ranked as good, 29% fair, 18.8% poor, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

MISSISSIPPI WIRE GLASS CO.,
220 Fifth Avenue,
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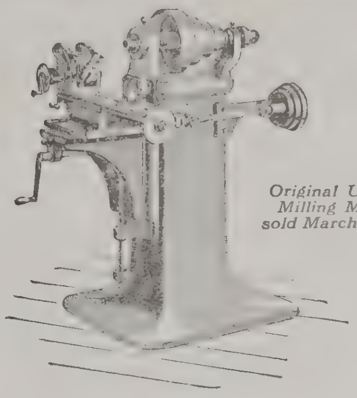

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The Universal Milling Machine was one of the most important machine-tool inventions which sprang from the necessities of the Civil War.

At that time, the manufacture of percussion nipples required large numbers of twist drills made by the best method then known—filing spiral grooves in steel wire with a rat-tail file.

Hand-filing was so expensive that Mr. Joseph R. Brown, of J. R. Brown & Sharpe, was consulted as to the possibility of a machine for grooving these drills.

The result was the Universal Milling Machine, suitable for many kinds of spiral milling, gear cutting and other work previously done by hand.

From this beginning the Brown & Sharpe line has grown to include over 30 sizes of milling machines—Universal, Plain, Vertical Spindle and Automatic. A large number of these are heavy machines particularly suited to production work.

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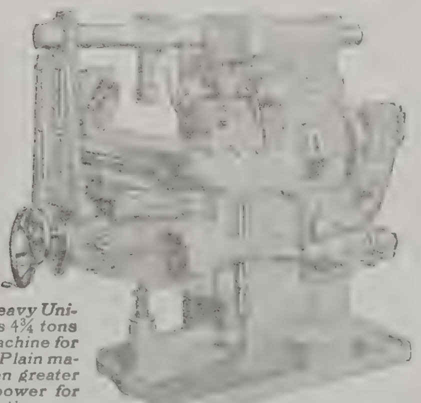

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RISLEY DIES

Frank Risley, 20 years old, a member of the class of 1925, was killed almost instantly about fou ro'clock Thursday afternoon, March 8, in front of the school when he attempted to board a passing truck, sliped and fell beneath the wheels of the truck.

Risley had just come out from school and had started to walk in, when a heavy truck of the Standard Oil Company passed. He ran after the truck, and failing to gain a foothold, slipped and fell beneath the truck, the right rear wheel passing over his body near the neck.

A party of tourists, coming behind the truck, stopped, picked up Risley, and rushed him to the hospital. The doctors there pronounced him dead when he arrived, attributing his death to a broken neck.

A mass meeting of the students was called Friday morning, at which time resolutions were drawn up by the faculty and student body expressing deep regret at the death of young Risley. As the funeral was held on Sunday afternoon, exercises of the Institute were suspended Friday afternoon, in token of respect to the departed member of the Rose family.

Funeral services were held from the Central Christian church, and interment followe dat Highland Lawn cemetery. The student body of Rose turned out en masse to honor the memory of one of their number and attended the services in a body.

Eulogies are at best painful memories, but, as Rev. B. W. Tyler said in his sermon, "the better you knew Frank, the more you liked him." Assiduous in his industry, sober in his pursuit of knowledge, he was recognized as an honest, industrious student.

Certainly his memory cannot fail to last in the hearts of students of Rose with whom he was associated.

The fateful accident to Risley was preceded by an hour by a serious accident in the woodshop.

Paul Hays, Senior Mechanical, while working a piece on a large power rip saw, suffered the loss of three fingers on his right hand when the saw bit into a rotten place in the wood and his hand became ensnarled in the teeth of the saw.

Hays will probably be kept out of school for a number of weeks, as a result of his accident. He was reported as progressing well, and at the time of going to press, no infection had set in in his hand.

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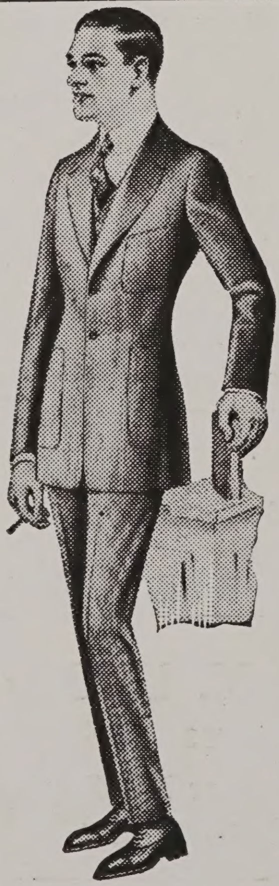

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Engineering Levels Mountains

The Pack Train has become a relic of the past, along with the Prairie Schooner. Modern methods of transportation have leveled mountains, brought San Francisco nearer to New York, and widened the markets of all our great industries.

And the engineering brains and energy, that have developed transportation to the prominence it holds in the business of the world today, are no longer employed in improving means of overland travel alone. Street Railways, Elevator Systems, Interurban Lines and Improved Shipping Lines—these are some of the accomplishments of engineering in the development of better transportation.

Neither have the builders of such systems been concerned only in the actual hauling of people and materials. A study of the methods of handling passengers and freight at the large terminals has developed the Terminal Engineer, who has greatly improved existing methods, and has developed entirely new ones, as well.

Engineering, as it is applied to transportation, has had to concern itself with many kinds of materials and many ways of handling them under all manner of circumstances. For instance the problems surrounding the handling of iron ore, in bulk, are vastly different from those encountered in moving any one of the finished products manufactured from iron ore, that must also be transported in large quantities. But Engineering constantly meets each situation with improved transportation facilities.

Industry, as a whole, and the nations and the people of the world owe much to the engineers, associated with such large manufacturing industries as Westinghouse. They have not only brought about vast improvements, but they have done so at a constantly decreasing cost to those who derive the greatest benefit from them.

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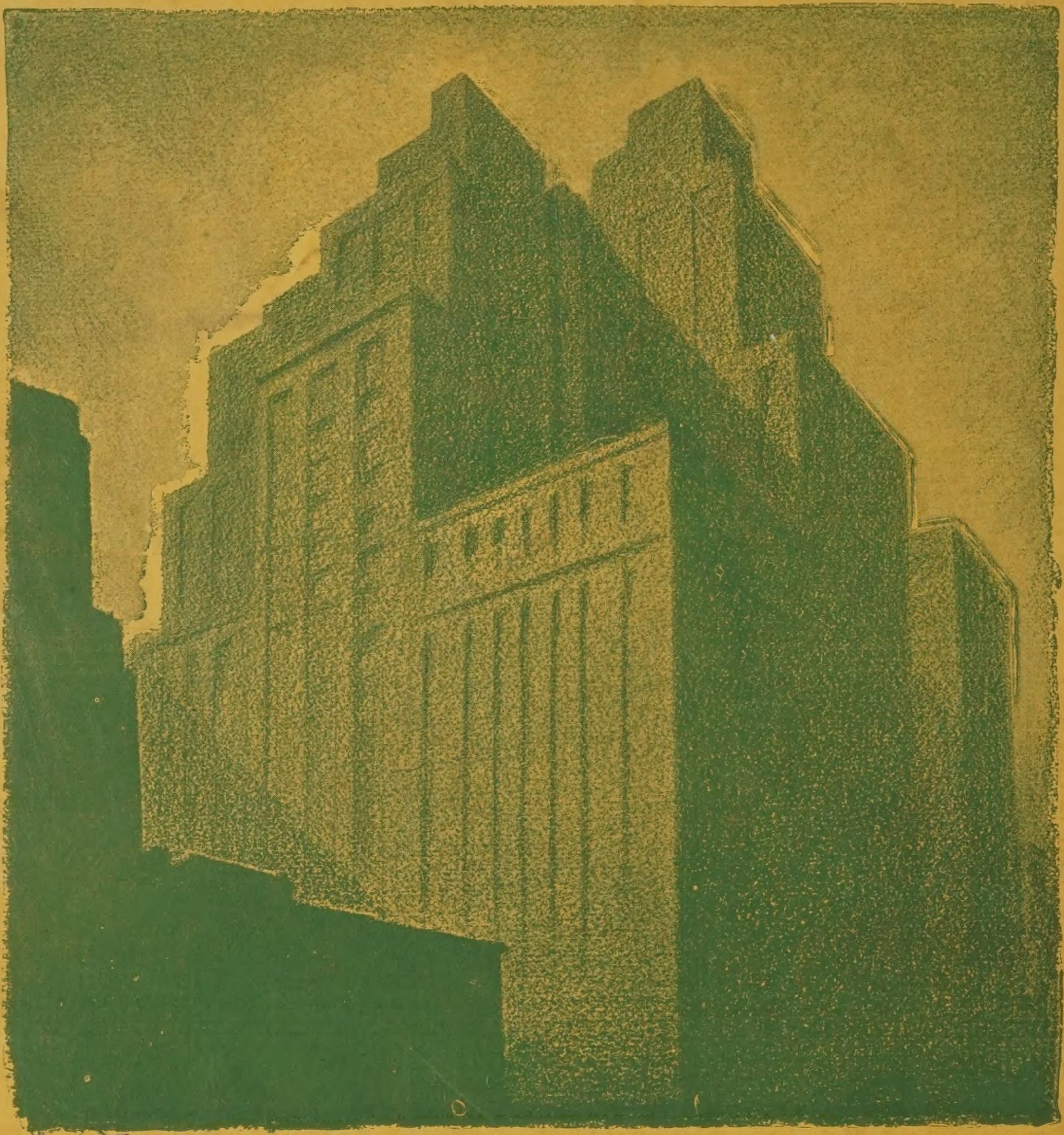

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